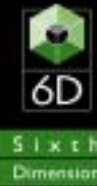


DOE/DER Peer Review



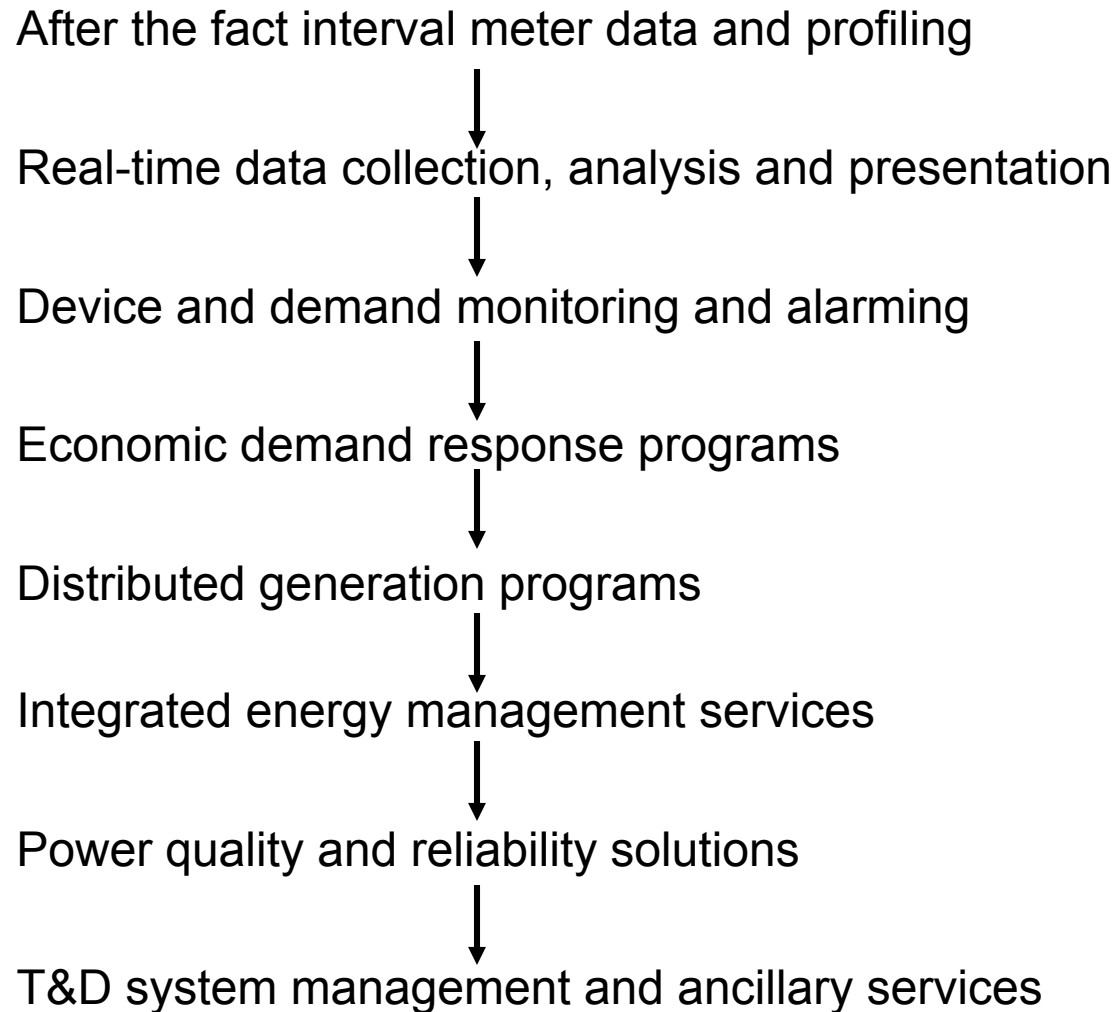
Intelligent Networking for Distributed Energy Resources

An Industry Perspective on Communication and Control for DER

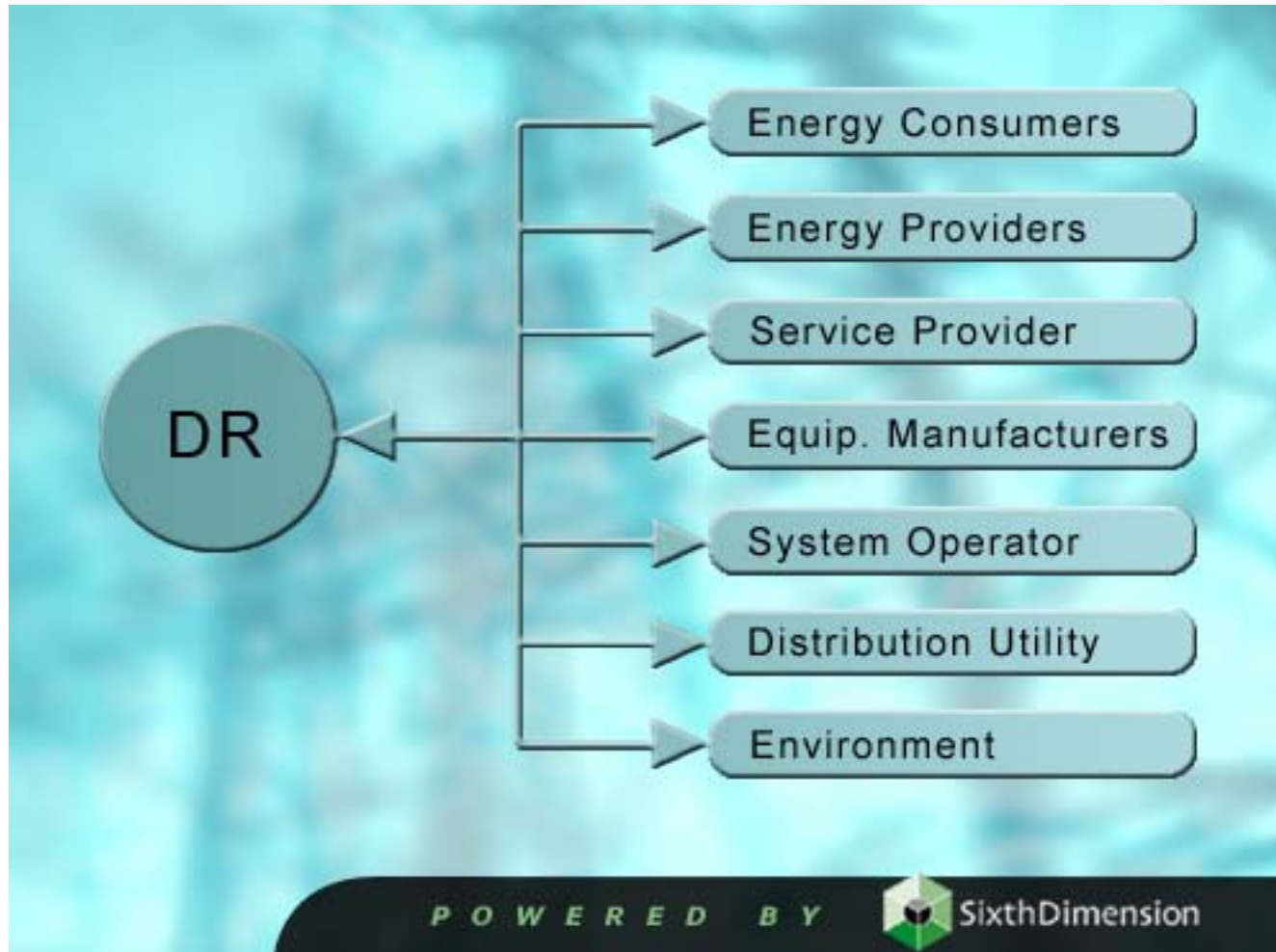
Nov. 30, 2001

***Dr. Sunil Cherian
Sixth Dimension, Inc.***

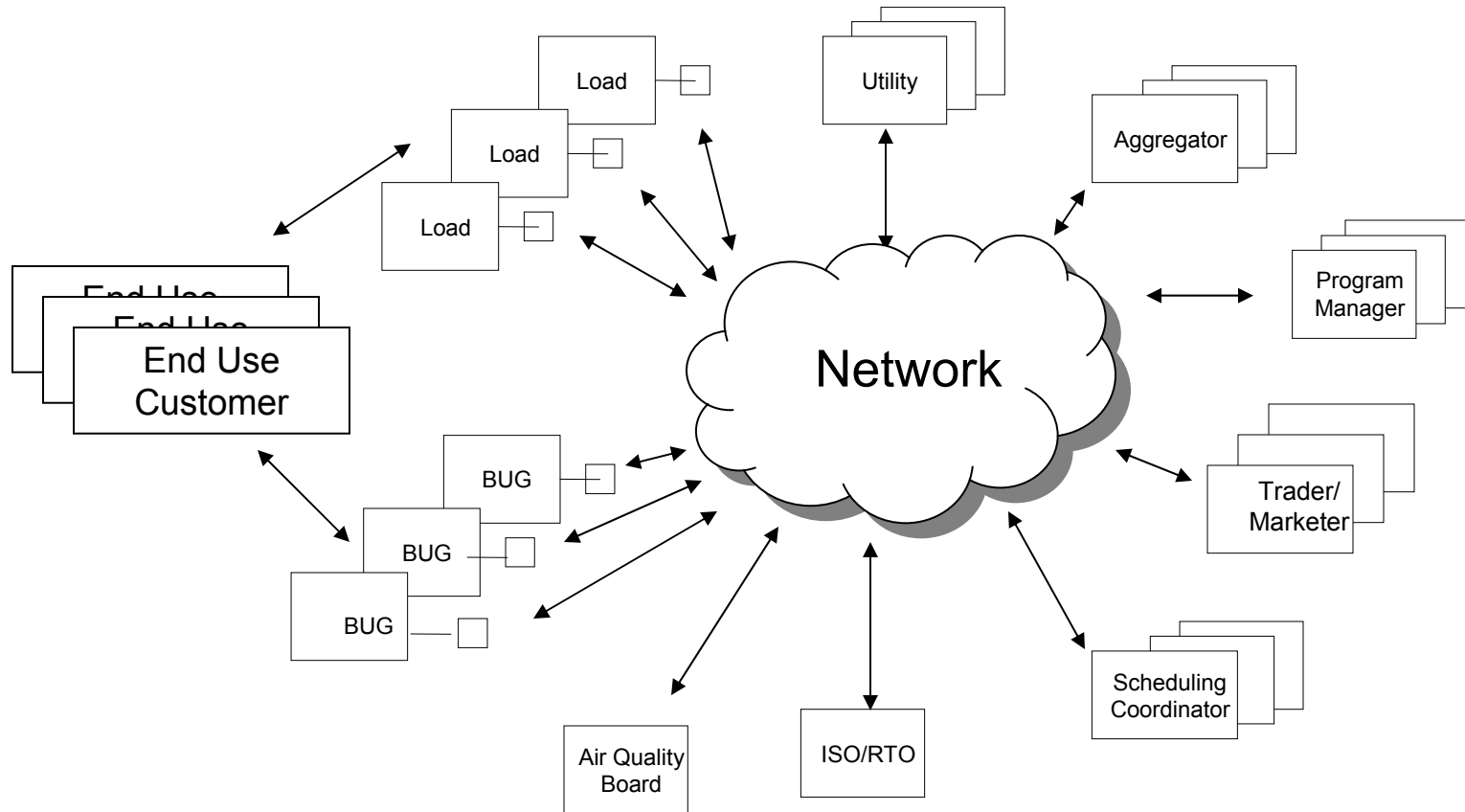
Spectrum of Energy Management Services



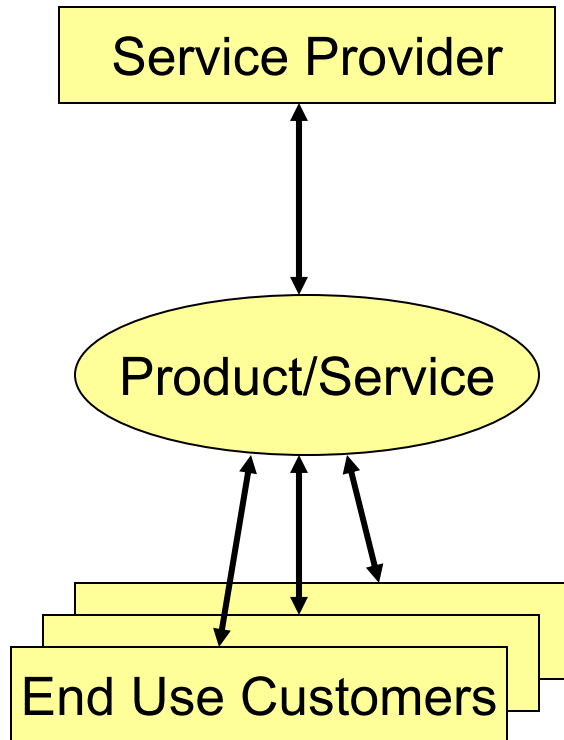
DER Value Streams



Energy Management Services Require the Integrated Efforts Of Many Parties

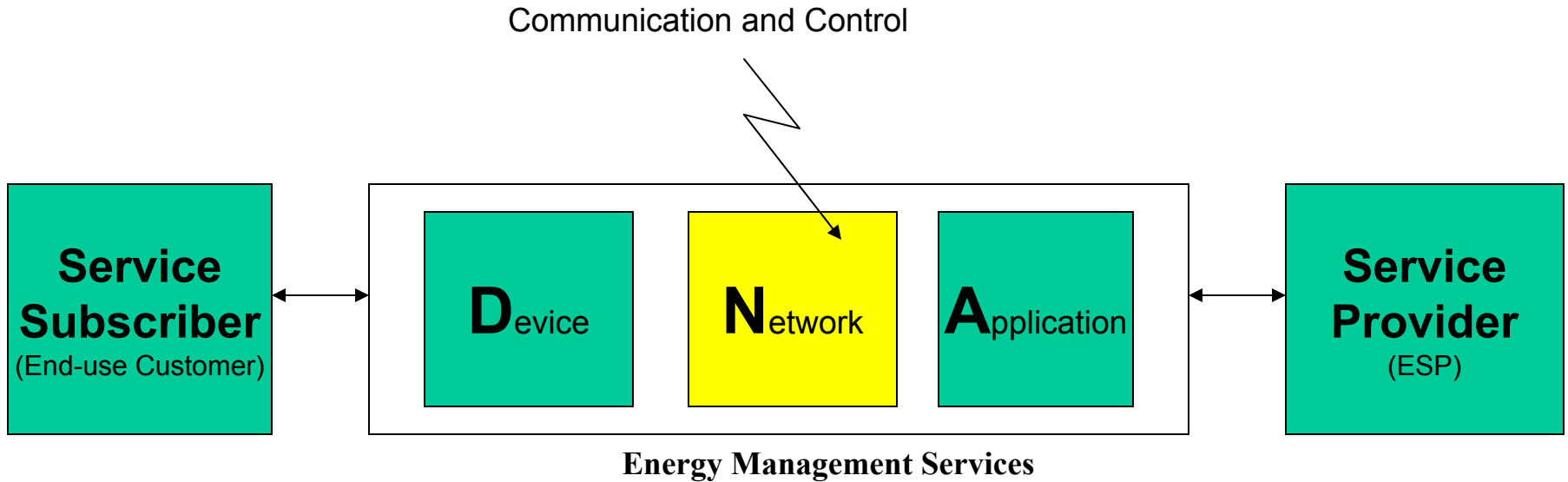


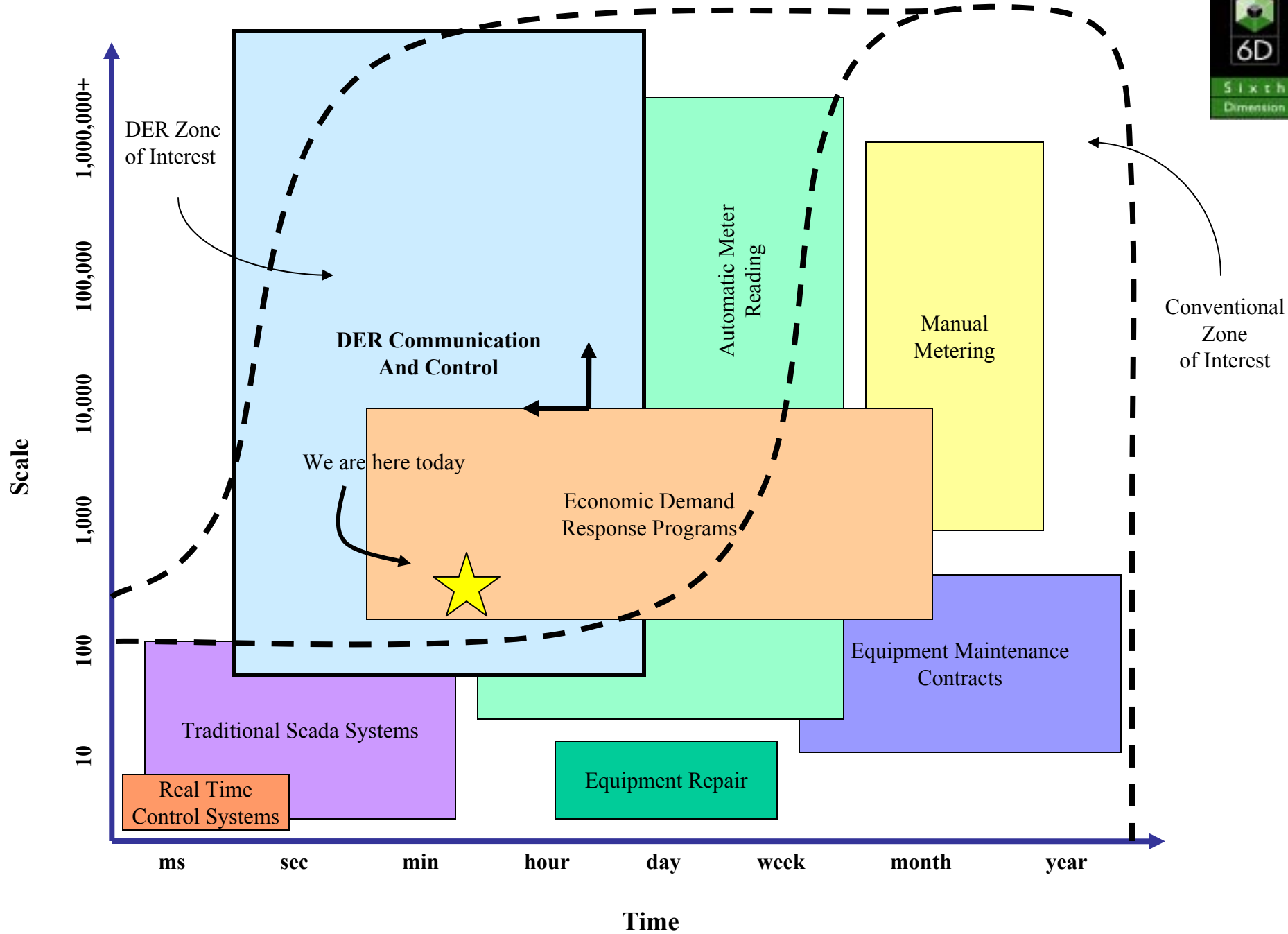
What's needed to properly integrate the efforts of all these parties is...



... a managed network infrastructure that connects *any* device to *any* application accessible to *multiple* parties in a scalable, secure and reliable fashion for the provision of energy management services.

DNA of Energy Management Services





Technology Gap

Each year Detroit produces about 15 million cars

At 50kW/car = 750,000MW ➡ almost equals US installed capacity!

Discrete technologies for power generation, transmission, storage and conditioning only solve part of the DER problem.

The full potential of new energy generating, transmitting, storing, and conditioning devices cannot be realized until a comprehensive communications and controls infrastructure is available for seamlessly interconnecting these devices with markets, market participants, and the existing grid.

R&D Needs

- System models for the intelligent grid and analysis tools for predicting system dynamics under 20+% DER penetration
- Dynamic market models and the development of metrics for market signals
- Quantifying value streams, measurement and verification methods, and standardization for market participation
- Smart interface standards for both physical and information interconnection
- Large-scale (1000+ nodes) test implementation for technology and market validation

DER Communication and Control—Enabling a new generation of products and services

“As tremendous as the influence of financial inventions have been, the influence of network inventions will be as great or greater.”

—*Kevin Kelley, Wired Magazine, Editor at Large*

“Physical space will carry commodities: electrons and molecules. Cyberspace will carry products and services...”

— *Vinod Dar, Energy E-Comm.com Inc.*